Pericardial adhesions as a consequence of cryoballoon ablation detected during the hybrid AF ablation procedure

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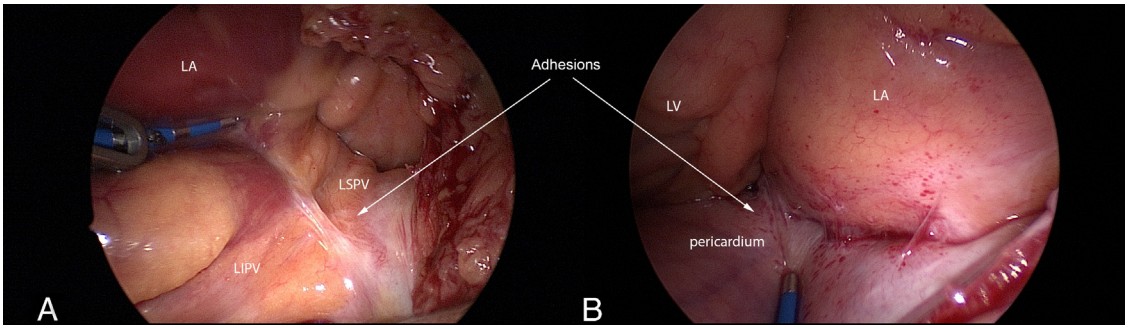

Figure 1 Thoracoscopic visualization of pericardial adhesions. A: Fibrosis around LSPV. B: Abundant adhesions around the rest of the veins. LA = left atrium; LIPV = left inferior pulmonary vein; LSPV = left superior pulmonary vein; LV = left ventricle.

Introduction

Pericardial adhesions, which can complicate or even preclude epicardial procedures, are a well-known consequence of cardiac surgery or epicardial radiofrequency (RF) ablation.[1,2] Here we present the images of pericardial adhesions related to previous pulmonary vein (PV) cryoballoon ablation.

Case report

A 65-year-old patient underwent a hybrid procedure for the treatment of long-standing persistent atrial fibrillation (AF). Given that the patient already had undergone 2 ablation procedures and presented with markedly dilated atria (left atrium diameter 53 mm), a hybrid ablation was preferred because of the possibility of it being a more successful option than a hypothetical third endocardial procedure.[3] The hybrid procedure comprised thoracoscopic epicardial pulmonary vein isolation (AtriCure Synergy ablation clamp; AtriCure Inc, Cincinnati, Ohio) and a box lesion creation consisting of roof and inferior line (Isolator Pen and Coolrail; AtriCure Inc) followed by the transvenous catheter confirmation of epicardial lesions.

The first ablation procedure, performed 2 years before the hybrid approach, was pulmonary vein isolation using a 28 mm second-generation cryoballoon (Arctic Front Advance; Medtronic, Minneapolis, Minnesota). All veins received 2 freeze–thaw cycles of 3 minutes with the minimal achieved temperatures of –47ºC in the left superior, −56ºC in the left inferior, −57ºC in the right superior, and −54ºC in the right inferior PV. Owing to the AF recurrence, a second procedure was performed 5 months after the cryoballoon ablation, using the RF energy (Ensite; St Jude Medical, St Paul, Minnesota). At that time PV isolation was confirmed and only a superior vena cava isolation was performed. Despite the 2 ablation procedures, the patient still experienced AF recurrences, so the hybrid procedure was planned. A left-sided thoracoscopic approach was used. After the opening of the pericardial sac, pericardial adhesions around the former cryoablation lesions were detected (Supplementary Video available online). A somewhat lesser extent of fibrosis was visualized in the area of the left superior PV (Figure 1A) but

KEYWORDS Atrial fibrillation; Cryoballoon ablation; Pericardial adhesions; Hybrid procedure

ABBREVIATIONS **AF** = atrial fibrillation; **PV** = pulmonary vein; **RF** = radiofrequency (Heart Rhythm Case Reports 2016;2:111–112)

V.V. is currently receiving an EHRA educational grant (fellowship in clinical electrophysiology with emphasis on catheter ablation) sponsored by St Jude Medical. G.B.C. and C.d.A. receive compensation for teaching purposes and proctoring from AF Solutions, Medtronic. C.d.A. and G.B. receive research grants on behalf of the centre from Biotronik, Medtronic, St Jude Medical, and Sorin and speakers fees from Biosense-Webster, Biotronik, and Medtronic. M.L.M. is a consultant for AtriCure **Address reprint requests and correspondence**: Vedran Velagic, Heart Rhythm Management Centre, Universitair Ziekenhuis Brussel, Vrije Universiteit Brussel, 101 Laarbeeklaan, 1090 Brussels, Belgium. E-mail address: vvelagic@gmail.com.

http://dx.doi.org/10.1016/j.hrcr.2015.07.005

KEY TEACHING POINTS

- Pericardial adhesions, a very well-known consequence of prior cardiac surgery, pericarditis, or previous epicardial ablation procedures, can occur even after endocardial ablation, particularly when using second-generation cryoballoon technology. Robustness of improved cryoenergy delivery might be the cause of such pericardial reactions.
- It seems possible that minimal achieved temperatures during cryoballoon ablation correlate with the transmurality of lesions, which in turn could cause pericardial reaction resulting in adhesions. Also, they might be a marker of chronic pulmonary vein isolation.
- In most cases, pericardial adhesions do not preclude further epicardial ablation procedures. Adhesions usually can be divided by blunt dissection and the epicardial procedure can be carried out successfully.

more abundant adhesions were found around the rest of the veins (Figure 1B). Using a standard quadripolar catheter the PV isolation was confirmed epicardially for all veins, except the left superior PV, which was the only vein with the late reconnection. Isolated veins showed a larger amount of pericardial adhesions, which also correlated with the lower minimal temperatures recorded during the initial cryoablation procedure. Later on, an epicardial RF ablation (left PV isolation + posterior box) was performed and confirmed by the standard endocardial mapping.

Discussion

Since the patient never underwent cardiac surgery or interventional procedures and never presented with pericarditis in his medical history, we hypothesized that the adhesions might be the result of prior cryoablation. Interestingly, except for the short-lasting chest pain that is quite common after this type of procedure, the patient did not present any other symptoms or signs after the cryoablation that could be related to the development of pericardial reaction. To the best of our knowledge, pericardial adhesions as a consequence of cryoablation have not yet been described in the literature. It seems that they correlate with the minimal achieved temperature recorded at the particular vein, which in turn correlates with the long-term PV isolation. Probably, transmural cryoablation lesions caused localized pericarditis that resulted in a pericardial fibrosis. The aforementioned complication did not have significant impact on the epicardial procedure; adhesions were easily divided and the epicardial ablation was successfully performed. Furthermore, in our case the safety of the procedure was not compromised by pericardial adhesions, and the whole hybrid procedure duration was not significantly prolonged. Also, there was no PV stenosis detected.

Appendix

Supporting Information

Supplementary material cited in this article is available online at http://dx.doi.org/10.1016/j.hrcr.2015.07.005.

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